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## Implementation of an Interactive, Multi-Language, App-Based Neurocognitive Evaluation Program into Routine Stereotactic Radiosurgery Practice

Tugce Kutuk $^1$ , Amber Balda $^1$ , Yazmin Odia $^2$ , Matthew D. Hall $^{3,\,1}$ , Haley Appel $^1$ , Suyen Ramos $^1$ , Miguel Ramirez Menendez $^1$ , Alexander Mohler $^2$ , Michael McDermott $^4$ , Manmeet S. Ahluwalia $^5$ , Minesh Mehta $^6$ , Rupesh Kotecha $^1$ 

1. Radiation Oncology, Miami Cancer Institute, Miami, USA 2. Neuro-Oncology, Miami Cancer Institute, Miami, USA 3. Radiation Oncology, Herbert Wertheim School of Medicine, Florida International University, Miami, USA 4. Neurosurgery, Miami Neuroscience Institute, Miami, USA 5. Department of Medical Oncology, Miami Cancer Institute, Miami, USA 6. Department of Radiation Oncology, University of Maryland School of Medicine, Miami, USA

#### Corresponding author: Tugce Kutuk, tugcek@baptisthealth.net

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## Abstract

## Objectives:

Neurocognitive decline among patients receiving stereotactic radiosurgery (SRS) is a significant negative predictor of functional status and clinical outcome. Conventional in-person neuropsychological tests are arduous to process, time-consuming, labor-intensive, costly, and require highly-trained specialists. The objective of this prospective study was to implement an alternative app-based solution that would allow management of multiple patients simultaneously, monitor patient assessments over time, collect patient data easily, and be suitable for cross-cultural use in multiple languages.

### Methods:

Patients undergoing SRS from December 2021 to September 2022 enrolled onto a prospective clinical trial (NCT05504681) and were analyzed in this study. The interactive, app-based assessment consisted of 5 domains in 6 available languages (including English, Spanish, French, etc): learning and memory (Hopkins verbal learning test-revised [HVLT-R]), attention and processing speed (Digit symbols modalities test [SDMT]), verbal fluency (Controlled oral word association test [COWAT]) and executive function (Trail making test [TMT]). Patients underwent neurocognitive evaluation prior to treatment as well as with routine imaging and clinical follow-up, typically at 3-month intervals. To evaluate the functionality and usefulness of the application in terms of user experience, participants completed a patient feedback survey after 2+ assessments. Mean relative decline from baseline for each test was assessed.

## Results:

Fifty SRS patients (41 brain metastases, 9 primary brain tumors) with median age of 69 years (range, 32-86 years) were enrolled; 30 patients (60%) were Hispanic, 14 (28%) were White/Caucasian, and 6 (12%) were African Americans. 41% of patients performed testing in Spanish. The median Karnosky Performance Scale (KPS) score was 90%; 56% were female; 60% of participants had a high school or equivalent level of education. At 6 months, the mean relative decline was 15.9% for HVLT-R-immediate recall (IMM), 11.4% for COWAT, and 6.1% for HVLT-R-delayed recall (DR). However, we observed a mean relative improvement of 40.5% for SDMT, 30.2% for TMT B, 24.1% for TMT A, and 14% for HVLT-R-recognition (Rec). Among 32 (64%) patients who completed the patient feedback survey, the majority found the system and questions easy to understand (97%), easy to use (93.8%), and relevant to their care (71.9%). Most patients reported that app-based neurocognitive evaluation improved discussions with clinicians (75%), made them feel more in control of their own care (78.1%), and 84.4% reported that they would recommend the system to other patients with CNS malignancies.

## Conclusion(s):

The first implementation of the interactive, multi-language, app-based neurocognitive evaluation program shows broad patient acceptance, a very favorable and positive patient experience, and a high level of compliance in following neurocognitive function in patients undergoing SRS. Based on these findings, our preliminary conclusion is that the clinical utility and value of implementing this app-based program into

routine SRS practice is substantive, and therefore this has now been broadly incorporated in our practice.